



**UNITED STATES DEPARTMENT OF COMMERCE**  
**Patent and Trademark Office**

Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
-----------------	-------------	----------------------	---------------------

09/362,808 07/28/99 ZHANG

H 07977/088002

020985 MMC2/0307  
FISH & RICHARDSON, PC  
4350 LA JOLLA VILLAGE DRIVE  
SUITE 500  
SAN DIEGO CA 92122

EXAMINER

TRAN, T

ART UNIT

PAPER NUMBER

2814  
DATE MAILED:

03/07/01

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

# Office Action Summary

Application No.

39/362,808

Applicant(s)

Zhang

Examiner

THANH V TRAN

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 December 1998 and 12 October 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

- 15) ☐ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 18) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: \_\_\_\_\_

---

**DETAILED ACTION**

Attorney's Docket Number 07977/088002

Filing Date: 07/28/99

Continuing Data: DIV of 08/753428 11/25/96 PAT 5,940,732

Claimed Foreign priority Date: none

Applicant(s) Zhang.

***Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119 (a)-(d). The certified copy has been filed in parent application No. 08/753428 filed on November 25, 1996

***Information Disclosure Statement***

3. I.D.S. on paper #2 is acknowledged. The Prior Art on the PTO-892 will not be entered to record. If the applicant wants a signed copy, he should submit the relevant prior art in a form PTO-1449.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 2, 6 to 13, 16 and 24 to 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. In claims 2, 6 and 10, it is unclear how the taper angles are defined. The limitation "with respect to said semiconductor layer" is ambiguous.

7. In claims 11-13 recite the limitation "said insulating films" in page 7, lines 1 and 2. There is insufficient antecedent basis for this limitation in the claims.

8. Claim 16 recites the limitation "said first and second interlayer insulating films" in page 8, line 10. There is insufficient antecedent basis for this limitation in the claim.

7. Claims 24 to 30 recites the limitation "said first interlayer insulating film" in page 10, line 20. There is insufficient antecedent basis for this limitation in the claims.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1,3 to 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Fu et al. Referring to Figure 6, Fu et al. disclose a semiconductor device having a semiconductor layer 10, a channel below polysilicon gate 14, drain 12a and source regions 12b. There is an insulating film 17 comprising silicon oxide (see column 2, line 51) formed on the semiconductor layer 10. Two interlayer insulating films 20 and 21 are comprised of silicon nitride covering the insulating film 17. Furthermore, an opening 25 is etched through the first interlayer film 20, the second interlayer film 21 (column 1, lines 53-54) and the insulating film 17 (column 2, line 13). This opening 25, with tapered sides (column 1, line 75), shows an opening in the second interlayer insulating film 21 surrounding an opening in the first interlayer insulating film 20, and the opening in the first interlayer insulating film 20 surrounds an opening in the insulating film 17 as shown in figure 6.

10. Fu et al. show the insulating film 17 comprise silicon oxide (column 3, line 31,32) as recited in claim 3, and the second interlayer insulating film 21 has a etching rate higher than the first interlayer insulating film 20.

### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 2,6 to 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fu et al. (U.S. Patent #4,342,617) in view of Auda (U.S. Patent # 4,814,041).

13. Fu et al. show most aspects of the instant invention ( in paragraph 9-10), except for a tapered angle of the second interlayer insulating film 21 ( called  $\beta$ ) with respect to a major surface the semiconductor layer 10 in the third opening is larger than a tapered angle of the first interlayer insulating film 20 ( called  $\alpha$ ) with respect to a major surface of the semiconductor layer 10 in the second opening as recited in claim 6. However, Auda discloses in column 5 , lines 22-45 , and shows in figure 1c that the SiO<sub>2</sub> layer 12a has low etch rate in CHF<sub>3</sub> compared to the PSG layer 12b, which etches fast in CHF<sub>3</sub> then the slope of the SiO<sub>2</sub> layer 12a will be smaller than the slope of the PSG layer 12b. Therefore, in view of Auda shown in figure 1c, where it is taught that the higher etching rate of an insulating film will produce an angle larger than the angle of another insulating film that has lower etching rate. These angles are the tilt angles of the cross-sectional shape of the contact holes with respect to a major surface below. As a result, referring to figure 6 of Fu et al., the second interlayer film 21 having high etching rate, will make a taper angle of the second interlayer film larger than the taper angle of the first interlayer 20 having lower etching rate. It is obvious to a person of ordinary skill in the art that etching protocol of Fu et al. will also produce taper angles as claim in the instant invention.

14. Claims 19-30 are rejected under 35 U.S.C 103(a) as being unpatentable over Fu et al. in view of Auda, and further in view of Huang et al. (U.S. Patent # 6,157,064) .

15. Fu et al. in view of Auda show most the aspects of the instant invention ( paragraph 12 and 13). except for having a channel region, a low doped impurity region and high doped impurity region being adjacent to the channel region with the low doped impurity region interposed between. In figure 1, Huang teaches to use a semiconductor layer 10 having a channel region with two low doped impurity 26 region and high doped impurity region 24 such as the high doped impurity region 24 being adjacent to the channel region with the low doped impurity region 26 interposes between. A light doped region is created next to a high doped region to minimize or eliminate short channel effects, such as hot carrier effects.. Therefore it is obvious to a person of ordinary skill in the art at the time of invention to form the light doped drain region as taught by Huang in the device of Fu et al. in view of Auda to eliminate the hot carrier effect.

16. Initially, with respect to claims 22,23,29 and 30, note that a "product by process" claim is directed to the product per se, no matter how actually made. See In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) and the related case law cited therein which make it clear that it is the final product *per se* which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. As stated in Thorpe, even though product-by-process claims are limited by and defined by the process, determination of

patentability is based on the product itself. *In re Brown*, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972); *In re Pilkington*, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969); *Buono v. Yankee Maid Dress Corp.*, 77 F.2d 274, 279, 26 USPQ 57, 61 (2d. Cir. 1935).

Note that Applicant has burden of proof in such cases as the above case law makes clear.

In claims 22,23,29 and 30, the dosage of dope used is an intermediate process step and does not affect the final device structure.

### **Conclusion**

17. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be fax to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the official Gazette, 1096 OG 30( 15 November 1989). The Art Unit 2814 Fax Center number is (703)308-7722 or -7724. The Art Unit 2824 Fax Center is to be used only for papers related to Art Unit 2814 applications.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to THANH V TRAN whose telephone number is 703-306-0208. The examiner can normally be reached on 8:00AM-5:00PM Monday through Friday or by e-mail via Thanh.Tran@uspto.gov.

19. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chuadhuri can be reached on 703-306 2794. The fax



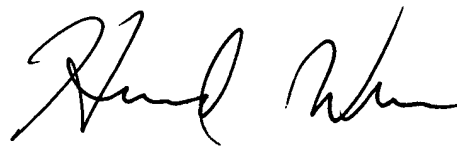
phone numbers for the organization where this application or proceeding is assigned are 703 -308-7722 for regular communications and 703 -305-3431 for After Final communications.

20. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

21. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S Class/Subclass(es): 257/774 438/638,640	Through 02/28/01
Other Documentation: none	
Electronic Database(s): WEST( USPAT)	Through 02/28/01

Thanh Tran  
March 2, 2001

  
Howard Weiss  
Tech. Center 2800